RGIA INSTITUTE OF TECHNOLOGY — OFFICE OF CONTRACT ADMINISTRATION

PROJECT ADMINISTRATION DATA SHEET

[x] ORIGINAL [ ] REVISION NO. _____

ct No. A-3218 DATE 5/18/82

ct Director: Dr. John C. Handley School/Lab EMSL

sor: Raytheon; Wayland, Mass.

e Agreement: P.O. #53-1413-EG-96010 under Contract #MDAC81-01-5004

rd Period: From 4/1/82 To ~~open~~ 3/22/83 (Performance) _____ (Reports)

nsor Amount: $131,945 9/30/83 Contracted through:

t Sharing: _____ GTRI/~~GIT~~

e: Solar Furnace Test Program and Thermal Radiative Measurements

MINISTRATIVE DATA OCA Contact Linda H. Bowman x4820

Sponsor Technical Contact:

Miss Kathleen M. Keefe or
Mr. David A. Rosato
Raytheon Co.
Boxton Poast Rd.
Wayland, Mass. 01778

2) Sponsor Admin/Contractual Matters:

Mr. Gene E. Philbrick
Subcontract Specialist
Raytheon Co.
Boston Post Rd.
Wayland, Mass. 01778
617-358-2721; x2577

fense Priority Rating: none Security Classification: none

ESTRICTIONS

e Attached N/A Supplemental Information Sheet for Additional Requirements.

avel: Foreign travel must have prior approval – Contact OCA in each case. Domestic travel requires sponsor approval where total will exceed greater of $500 or 125% of approved proposal budget category.

uipment: Title vests with sponsor

OMMENTS:

Budget broken down by Tasks: A-3218-01 20,565
A-3218-02 111,380
$131,945

COPIES TO:

Administrative Coordinator
Research Property Management
Accounting
Procurement/EES Supply Services
Research Security Services
Reports Coordinator (OCA)
Legal Services (OCA)
Library
EES Public Relations (2)
Computer Input
Project File
Other _____

FORM OCA 4:781

A INSTITUTE OF TECHNOLOGY OFFICE OF CONTRACT ADMINISTRATION

SPONSORED PROJECT TERMINATION/C OSEOUT SHEET

Date February 9, 1984

No. A-3218 ~~School~~/Lab EMSL

s Subproject No.(s)

Director(s) Dr. John C. Handley GTRI / ~~GIT~~

or Raytheon; Wayland, Mass.

Solar Furnace Test Program and Thermal Radiative Measurements

ctive Completion Date: 9/30/83 (Performance) 9/30/83 (Reports)

nt/Contract Closeout Actions Remaining:

- [ ] None
- [x] Final Invoice or Final Fiscal Report
- [ ] Closing Documents
- [ ] Final Report of Inventions
- [ ] Govt. Property Inventory & Related Certificate
- [ ] Classified Material Certificate
- [ ] Other

Continues Project No. Continued by Project No.

PIES TO:

oject Director
esearch Administrative Network
esearch Property Management
ccounting
rocurement/EES Supply Services
esearch Security Services
eports Coordinator (OCA)
egal Services

Library
GTRI
Research Communications (2)
Project File
Other

orm OCA 60:1028

ENGINEERING EXPERIMENT STATION
Georgia Institute of Technology
A Unit of the University System of Georgia
Atlanta, Georgia 30332

September 14, 1982

Ms. Kathy Keefe
M.S. H.H. 5
Raytheon Company
Equipment Division
430 Boston Post Road
Wayland, Mass. 01778

Subject: Final Report, Task 1: Thermal Radiative Properties of Materials
Emittance Measurements

Dear Ms. Keefe:

The normal emittance as a function of temperature over the wavelength region 5.6 to 6.2 μm has been measured by Georgia Tech. A Barnes IT-7 infrared sensitive pyrometer was used. The experimental set up is shown in Figure 1. Nine samples that were supplied by Raytheon were measured. Table 1 is a compilation of the normal emittances. Figures 2 and 3 show the variation of emittance as a function of temperature.

The unknown emittance was determined by comparison with two known materials. Oxidized Kanthal and Platinum were used as standards for these measurements. It was not possible to make measurements below 400° F with the sample inside the furnace with the Barnes pyrometer. Measurements at 200° F were made by moving the pyrometer to within 12" of the heated samples. This was the minimum temperature for which data could be obtained.

The Measurements at 200° F were made after the 400, 700 and 1000° F determinations. Changes in the surface caused emittance values to be higher than a linear extrapolation would have indicated in all cases except E 12. These values are indicated by the dotted lines of Figures 2 and 3.

Samples E 11, 31 and 51 all had a blue appearance after the 1000° F test. All samples have been photographed and will be returned to Raytheon.

Sincerely,

John C. Handley
Senior Research Engineer

jw

AN EQUAL EMPLOYMENT/EDUCATION OPPORTUNITY INSTITUTION

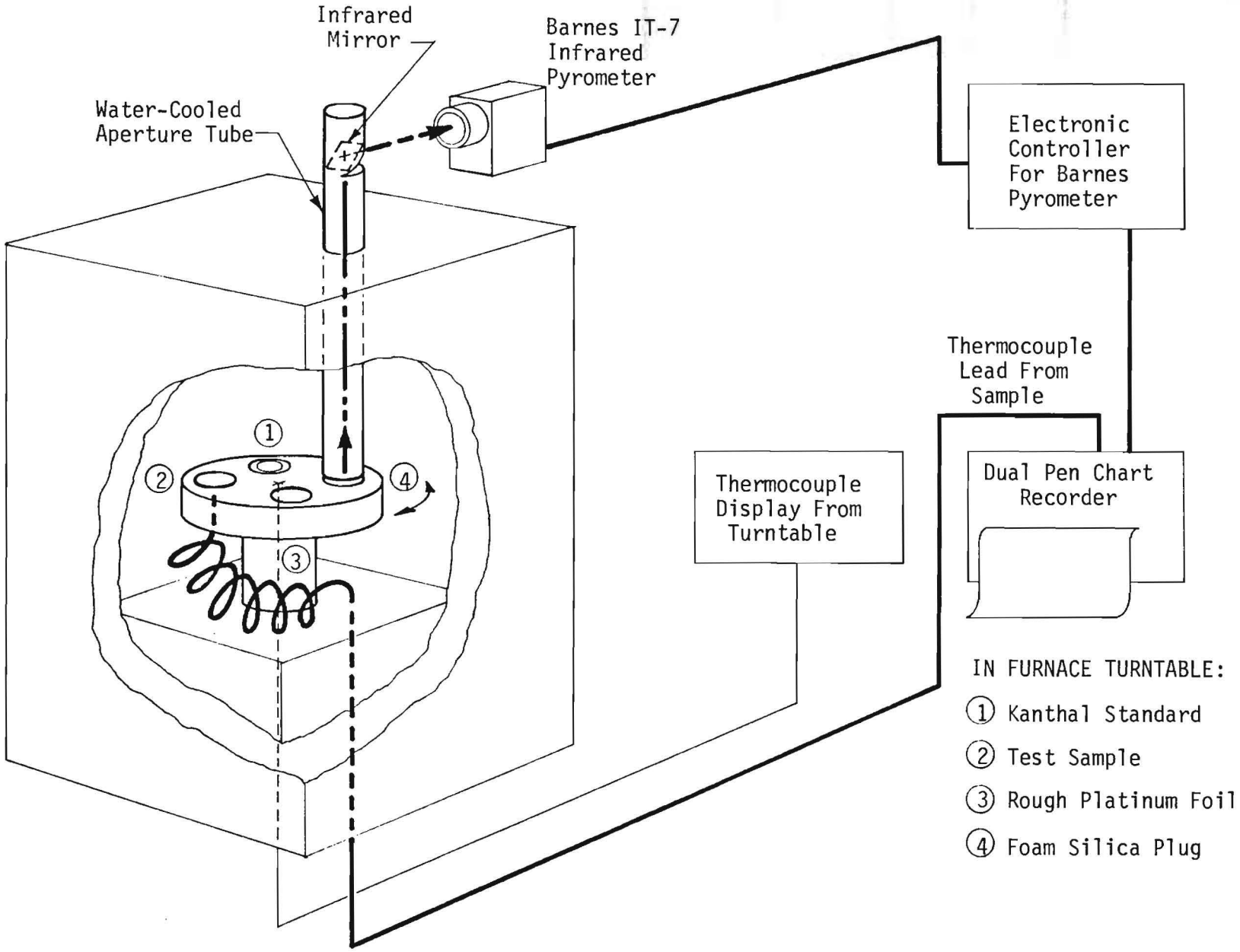


Figure 1. Experimental Setup.

TABLE 1

MEASURED EMITTANCES OF MECHANICAL SAMPLES

Samples	Temperature			
	200[1]	400	700	1000
E 11	0.22 ± 0.03[3]	0.16 + 0.03 - 0.02	0.16 ± 0.02	0.17 ± 0.01
E 12*	0.41 ± 0.03	0.50 + 0.01 - 0.02	0.49 ± 0.01	0.49 ± 0.01
E 13*	0.49 ± 0.01	0.48 ± 0.02	0.48 ± 0.01	0.49 ± 0.01
E 47	0.37 + 0.03 - 0.04	0.11 ± 0.01	0.12 + 0.02 - 0.01	0.40 + 0.03 - 0.04
E 45*	0.73 + 0.03 - 0.02	0.52 ± 0.01	0.53 ± 0.01	0.66 ± 0.01
E 46*	0.58 + 0.03 - 0.01	0.55 ± 0.02	0.58 ± 0.01	0.70 ± 0.01
E 21	0.32 + 0.02 - 0.03	0.19 ± 0.02	0.17 ± 0.02	0.28 ± 0.01
E 51	0.16 + 0.01 - 0.04	0.10 ± 0.01	0.10 ± 0.01	0.12 ± 0.01
E 31	0.17 ± 0.04	0.10 + 0.01 - 0.02	0.10 ± 0.01	0.12 ± 0.01
Kanthal[2]	0.51	0.52	0.54	0.55
Platinum[2]	0.090	0.096	0.105	0.113

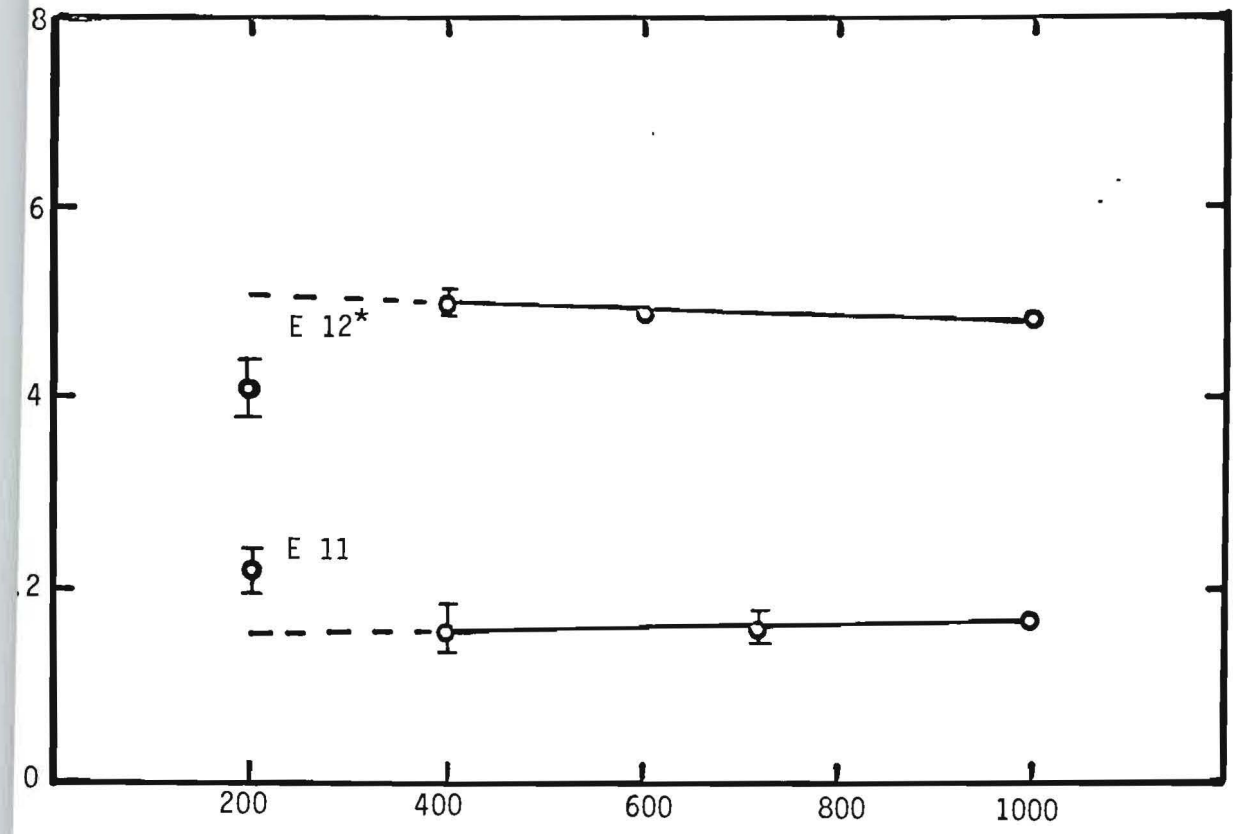
Notes:

*Debris damaged.

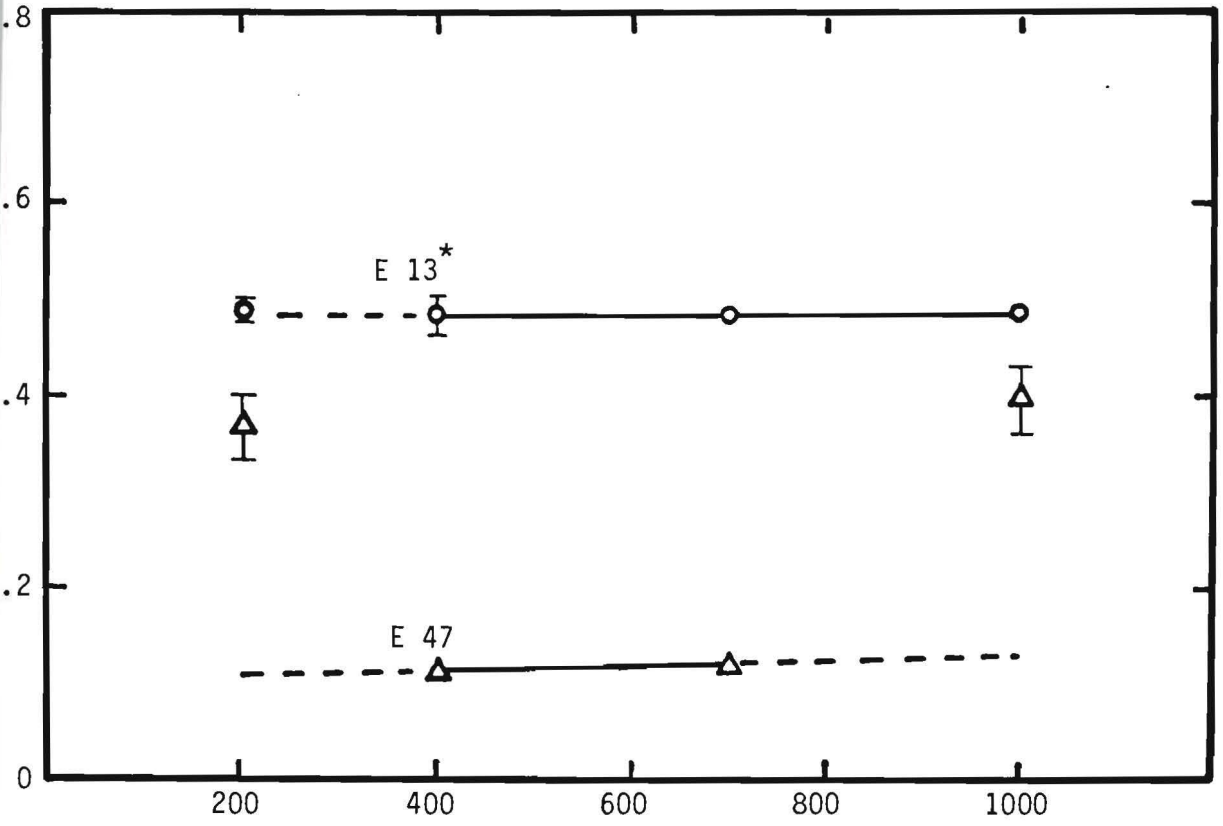
(1) Measurements at 200° F were after the 1000° F series. This was the lowest temperature measurement possible with the Barnes IT-7.

(2) These two materials were used as standards for comparison with each unknown sample.

(3) The range of the measurements is shown along with the average value of several determinations (3 to 6).

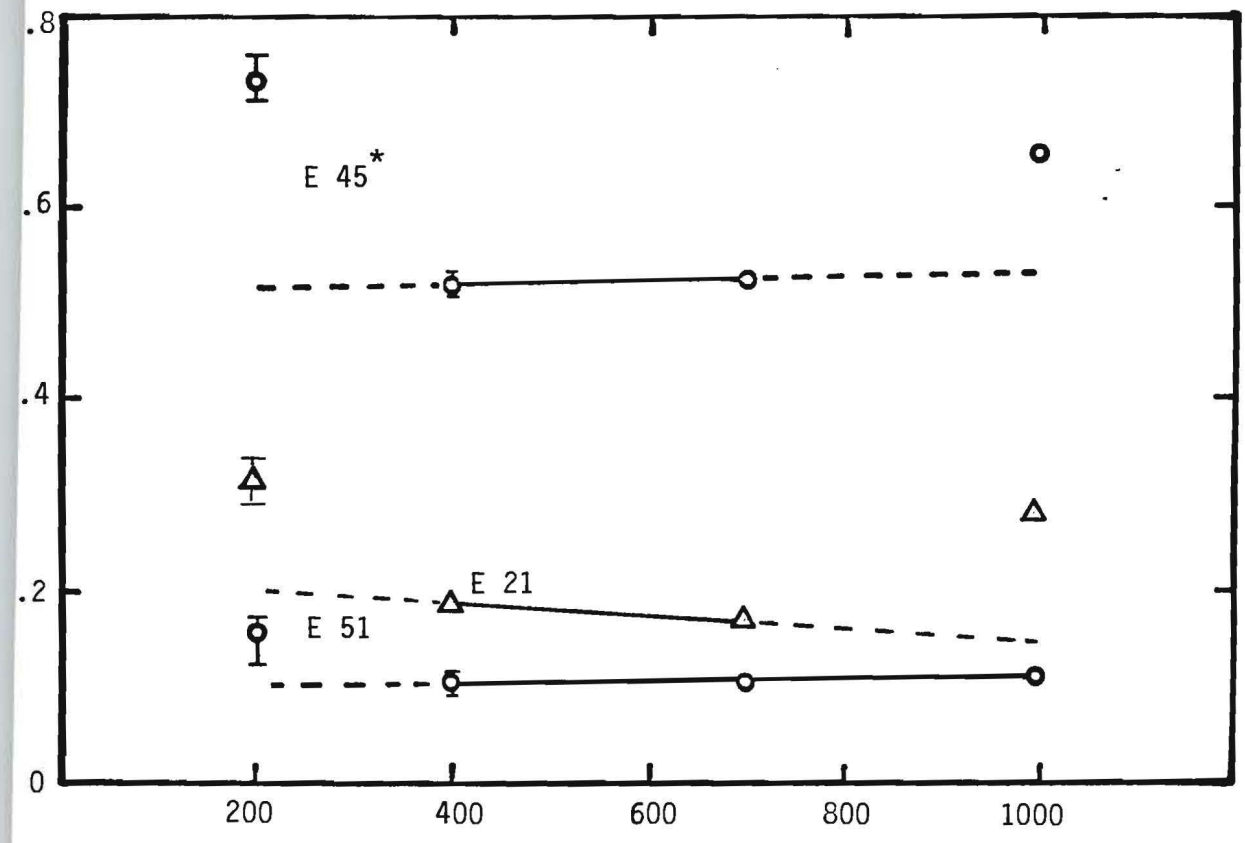


a

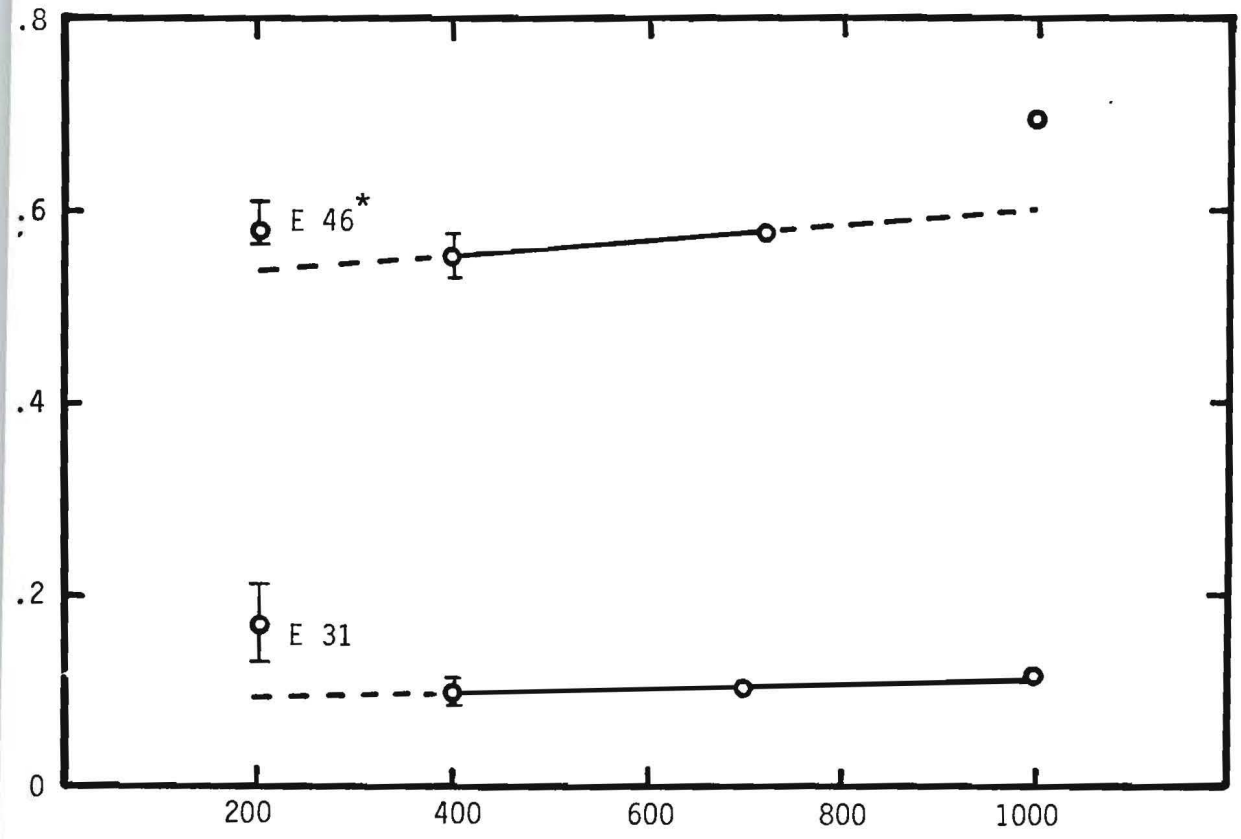


b

Figure 2. Emittances of Samples.



a



b

Figure 3. Emittances of Samples.